

REMARKS

Attached hereto is an Excess Claims Letter and fee.

Attached hereto is a marked up version of the changes made in the specification and/or claims by the current Amendment. The attached page is captioned "**Version with markings to show changes made.**"

It is noted that the claim amendments herein are intended solely to more particularly point out the present invention for the Examiner, and not for distinguishing over the prior art or the statutory requirements directed to patentability.

It is further noted that, notwithstanding any claim amendments made herein, Applicant's intent is to encompass equivalents of all claim elements, even if amended herein or later during prosecution.

Claims 1-30 are all of the claims pending in the present Application. New claims 23-30 have been added. Claims 9-21 are allowed. Applicants gratefully acknowledge the Examiner's indication that claims 2 and 3 would be allowable if rewritten in independent format. However, Applicants decline to rewrite these claims at this time since it is believed that these dependent claims are fully allowable once the significance of claim 1 is understood.

The Examiner objects to claim 2 as using terminology that the Examiner considers as lacking antecedent basis in the specification. Applicants disagree with the Examiner, since terminology in the claims are not required to match that of the specification if another term or description clearly conveys the concept to one of ordinary skill in the art. However, in order to expedite prosecution, Applicants have amended claim 2 to eliminate the adjective and respectfully request that the Examiner reconsider and withdraw this objection.

Claims 1, 4-7, and 22 stand rejected under 35 USC §102(b) as anticipated by US Patent 5,623,181 to Suehiro et al. Claim 8 stands rejected under 35 USC §103(a) as unpatentable over Suehiro, further in view of US Patent 3,938,177 to Hansen et al.

These rejections are respectfully traversed in view of the following discussion.

I. THE CLAIMED INVENTION

As described and claimed, for example by claim 1, the present invention is directed to a light-emitting diode including a light-emitting element. A lead assembly supplies electrical power to the light-emitting element. A reflection mirror is provided in an opposing relation to the light-emitting surface of the light-emitting element. A light-transmissible material seals the light-emitting element, a part of the lead assembly, and the reflection mirror. A radiation surface radiates light reflected on said reflection mirror to the outside.

The reflection mirror is a metal mirror which is obtained by processing a metal plate to give it a concave shape or which is obtained by mirror-surface-treating the concave surface of the metal mirror formed by the processing of the metal plate. The radiation surface is formed on the light-transmissible material at its surface at the rear of the light-emitting element.

An advantage of the present invention is that it provides a method of mass production for LEDs, using conventional metal-forming techniques to form the mirror. The metal plate provides a resistance to heat deformation during fabrication of the device as well as during the operation of the device.

The prior art references of record fail to teach or suggest using a metal plate as the starting point for an LED with a reflector.

II. THE PRIOR ART REJECTION

The Examiner asserts that US Patent 5,623,181 to Suehiro et al. anticipates the present invention as defined by claims 1, 4-7, and 22. However, an important feature of the present invention is that the reflecting mirror originates as a metal plate. In contrast, as clearly described at lines 8-27 of column 5, the reflector in Suehiro is achieved by a process such as plating.

Advantages of using a metal plate is that conventional (and inexpensive) metal-processing techniques can be used to mass-produce the mirror form, using a number of various techniques, including coining, stamping, and bending.

Hence, turning to the clear language of the claims, there is no teaching or suggestion in Suehiro of “...wherein said reflection mirror is a metal mirror which is obtained by processing a metal plate to give it a concave shape or which is obtained by mirror-surface-treating the concave surface of said metal mirror formed by said processing of said metal plate” (emphasis Applicant’s), as required by claims 1 and 7.

Relative to the rejection for claim 5, there is no teaching or suggestion in Suehiro of: ...“wherein said reflection mirror is a metal mirror which is obtained by combining plurality of metal portions to give the assembly a concave shape”(emphasis Applicant’s).

Relative to the rejection for claim 8, there is no teaching or suggestion in Suehiro of: ...“wherein said reflection mirror is a mirror which is obtained by processing ceramic to give it a concave shape” (emphasis Applicant’s). The Hansen reference fails to overcome this deficiency in Suehiro.

For the reasons stated above, the claimed invention is fully patentable over the cited

references.

Further, the other prior art of record has been reviewed, but it too, even in combination with the Suehiro or Hansen references, fails to teach or suggest the claimed invention.

III. FORMAL MATTERS AND CONCLUSION

Applicants also gratefully acknowledge the Examiners indication that only an abstract of the Japanese references listed in the Information Disclosure Statement filed May 3, 2001, were received. Applicants submit under separate cover a complete version of these Japanese references.

The Examiner also objected to the drawings for failing to include a "Prior Art" reference for Figures 27 and 28. Applicants submit under separate cover a proposed drawing change to address this concern.

Finally, the Examiner objected to the Abstract for including the extraneous term "Fig. 21". Applicants submit above a new version of an Abstract.

In view of the foregoing, Applicant submits that claims 1-30, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

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The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,



Date: 4/16/03

Frederick E. Cooperrider
Reg. No. 36,769

McGinn & Gibb, PLLC
8321 Old Courthouse Road, Suite 200
Vienna, Virginia 22182
(703) 761-4100
Customer No. 21254

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims have been amended, as follows:

1. (Amended) A light-emitting diode comprising:
 - a light-emitting element;
 - a lead assembly for supplying electrical power to said light-emitting element;
 - a reflection mirror provided in an opposing relation to the light-emitting surface of said light-emitting element;
 - a light-transmissible material for sealing said light-emitting element, a part of the lead assembly and the reflection mirror; and
 - a radiation surface for radiating light reflected on said reflection mirror to the outside, wherein said reflection mirror is a metal mirror which is obtained by processing a metal plate to give it a concave shape[,] or which is obtained by mirror-surface-treating the concave surface of said metal mirror[;] formed by said processing of said metal plate, and said radiation surface is formed on the light-transmissible material at its surface at the rear of the light-emitting element.
2. (Amended) A light-emitting diode as described in claim 1, wherein a [through-]hole is [prepared at the center of] formed through said reflection mirror.
5. (Amended) A light-emitting diode comprising:
 - a light-emitting element;
 - a lead assembly for supplying electrical power to said light-emitting element;
 - a reflection mirror provided in an opposing relation to the light-emitting surface of said light-emitting element; and
 - a radiation surface for radiating light reflected on said reflection mirror to the outside, wherein said reflection mirror is a metal mirror which is obtained by combining a plurality of metal portions to give the assembly a concave shape[,] or which is obtained by mirror-surface-treating the concave surface of said metal mirror.
8. (Amended) A light-emitting diode comprising:
 - a light-emitting element;
 - a lead assembly for supplying electrical power to said light-emitting element;
 - a reflection mirror provided in an opposing relation to the light-emitting surface of said light-emitting element;
 - a light-transmissible material for sealing said light-emitting element, a part of the lead assembly and the reflection mirror; and
 - a radiation surface for radiating light reflected on said reflection mirror to the outside, wherein said reflection mirror is a mirror which is obtained by processing ceramic [or

a resin] to give it a concave shape[;], and said radiation surface is formed on the light-transmissible material at its surface at the rear of the light-emitting element.

11. (Amended) A light-emitting diode as described in claim 9, wherein said metal mirror has received a mirror-surface-treatment on its concave surface.

The following new claims have been added:

23. (New) A method of fabricating a light-emitting diode (LED), said method comprising:
forming a metal plate into a concave shape to form a reflective element;
mounting a light emitting element relative said reflective element in a location that
emissions from said light emitting element are reflected; and
providing power connections to said light emitting element.
24. (New) The method of claim 23, further comprising:
treating a surface of said reflective element to improve a reflective characteristic.
25. (New) The method of claim 23, further comprising:
forming a hole through said metal plate.
26. (New) The method of claim 23, wherein said metal plate comprises a plurality of plate
sections, said plurality of plate sections predetermined in shape such that said concave surface
is formed when said sections undergo a process.
27. (New) The method of claim 23, further comprising:
adding a fluorescent material which converts a light emitted from said light emitting
element to a light of a different frequency.
28. (New) The method of claim 27, wherein said light emitted from said light emitting
element comprises light with a frequency in an ultra-violet region, said method further
comprising:
completing said LED assembly in a manner in which no resin is used.
29. (New) A light emitting diode (LED) comprising:
a light emitting element;
power connectors to provide power to said light emitting element; and
a reflector for reflecting a radiation from said light emitting element, said reflector
having a linear reflectance of 65% or higher.
30. (New) A light emitting diode (LED) comprising:

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a light emitting element;
power connectors to provide power to said light emitting element; and
a a fluorescent material which converts a light emitted from said light emitting
element to a light of a different frequency.